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IS 12447 (1988): Zinc wire for sprayed zinc coatings [MTD  
9: Lead, Zinc, Cadmium, Tin, Antimony and their Alloys]

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“Knowledge is such a treasure which cannot be stolen”





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*Indian Standard*

# SPECIFICATION FOR ZINC WIRE FOR SPRAYED ZINC COATINGS

**1. Scope** — This standard specifies the requirements of zinc wire used for metal spraying.

## 2. Terminology

**2.1 Ingot** — Virgin metal cast in the form of slabs of suitable shape and size, free from blow holes, cavities, cracks, oxide inclusion, slag and foreign matter.

**2.2 Wire Bar** — A product of solid circular cross-section of diameter 10 to 15 mm and of suitable length cast by melting the virgin ingots.

**2.3 Wire** — A product reduced by cold drawing from wire bar having uniform sound circular cross-section along its whole length, of diameter not exceeding 6 mm and supplied in the form of coils having continuous lengths.

**3. Supply of Material** — General requirements relating to the supply of zinc wires shall be as laid down in IS : 1387-1967 'General requirements for the supply of metallurgical materials (*first revision*)'.

## 4. Method of Manufacture

**4.1** Zinc wire shall be manufactured by cold drawing from wire rod through rolling or extrusion.

**4.2** Wire rod and slug will be cast for rolling and extrusion respectively from virgin zinc ingots.

## 5. Chemical Composition

**5.1** The chemical composition of zinc wires for metal spraying shall conform with the requirements specified in IS : 209-1979 'Specification for zinc (*third revision*)', grade Zn 99.95 as given in Table 1.

TABLE 1 CHEMICAL COMPOSITION OF ZINC WIRE

Values given are in *percent maximum*, unless shown otherwise.

Element	Requirement, Percent
Zinc, Min	99.95
Lead	0.025
Cadmium	0.02
Iron	0.01
Tin	0.001
Copper	0.002
Total impurities	0.05

**5.2** The chemical composition shall be determined either by the method specified in IS : 2600-1965 'Methods of chemical analysis of high purity zinc and zinc base alloys for die casting' or IS : 2599-1983 'Method of spectrographic analysis of high purity zinc and zinc base alloys for die casting (*first revision*)' or any other established instrumental/chemical method. In case of dispute, the procedure specified in IS : 2600-1964 shall be the referee method.

## 6. Diameters and Tolerances

**6.1** Zinc wire shall be supplied in the diameters with tolerance as specified in Table 2.

**6.2** The suppliers shall ensure that tolerances on zinc wire shall be well within the above specified limits to facilitate free movement in the spray guns.

**TABLE 2 DIAMETER AND TOLERANCES OF ZINC WIRE**  
*( Clause 6.1 )*

Diameter mm	Tolerance mm
2.00	
2.50	
3.17	+ 0.00
4.00	- 0.05

**Note** — Diameters of zinc wire given in this table are based on the hole sizes of the standard spray guns used for metal spraying.

**7. Type of Finish** — Zinc wire shall be supplied in the following conditions as specified by the purchaser:

- a) Cold drawn, annealed and descaled; and
- b) Hot drawn and descaled.

**8. Freedom from Defects** — Zinc wire shall be free from burrs, cuts, slivers, die marks, splits, kinks, bends and twists. The wire shall be clean, smooth, uniform in diameter, and free from surface flaws and oxide inclusions.

### **9. Mechanical Properties**

**9.1 Tensile Strength** — The tensile strength of zinc wire, when tested according to Appendix A, shall not be less than 100 MPa.

**9.2 Elongation** — The permanent elongation of the gauge length at break shall not be less than 40 percent of the original gauge length, when tested according to Appendix A.

**9.3 Wrapping Test** — Zinc wires, when subjected to wrapping test according to IS : 1755-1983 'Method of wrapping test for metallic wire (*first revision*)', shall withstand without breaking, splitting or cracking when wrapped eight times around its own diameter and subsequently straightened.

### **10. Supply Length**

**10.1** Zinc wires shall be supplied in coils or spools of continuous lengths. The minimum mass of the coil should be 25 kg, unless otherwise specified in the order. However, in case of spools, the minimum mass may be 10 kg.

**10.2** Wires of cut lengths and discontinuity of wire within a coil shall not be permitted.

### **11. Sampling, Retest and Criteria for Acceptance**

**11.1** Unless otherwise agreed to between the purchaser and the supplier, the following sampling and retest procedure and criteria for conformity shall hold good.

**11.2 Lot** — In any one consignment, all coils/spools of wire of same diameter manufactured by a single firm under essentially similar conditions of production shall be grouped together to constitute a lot.

**11.3** All coils/spools of wire shall be examined from each lot for the freedom from defects, and for diameters and its tolerance. Any coil found defective shall be rejected.

**11.4** One test for chemical composition shall be conducted for 100 kg or part thereof of wires in one lot or one test for 500 kg or part thereof of a lot comprising the same cast. If the results obtained are satisfactory, the lot shall be considered as conforming to the chemical requirements of this specification.

**11.4.1** If the test results of the chemical composition fail to satisfy the requirement for any of the characteristics, two more tests for that characteristic shall be done on the same sample in order to confirm that the analysis has been done properly. If the results of the retests are satisfactory, the lot shall be accepted, otherwise the lot shall be rejected.

**11.5** The sample for mechanical test shall consist of one test for every 100 kg or part thereof in a lot. The lot shall be considered as conforming to the requirements of tensile strength, elongation, and wrapping test, if the test results satisfy the requirements specified in **9.1 to 9.3**.

**11.5.1** If the test results fail to meet the mechanical properties requirements specified in 9.1 to 9.3, two more tests shall be carried out for that requirement. If both the test results satisfy the relevant requirements, the lot shall be accepted, otherwise the lot shall be rejected.

**12. Packing** — Zinc wire to be supplied in coils of continuous lengths shall be closely coiled without any loose turns. The inner diameter of the coil shall be 300-600 mm. The coils shall be bound and fastened compactly at two places on the opposite ends of a diagonal of the coils using binding wires. Each coil shall be wrapped all round with hessian to avoid damage and scratches during transit and storage.

### **13. Marking**

**13.1** Each coil of zinc wire shall be attached with a suitable metallic tag or label with marking made on them indicating the name of the manufacturer, diameter of the wire, mass of coil, batch number and date of manufacture.

**13.2 Standard Marking** — The wire may also be marked with the Standard Mark. The details of standard marking scheme are available from the Bureau of Indian Standards.

### **14. Information to be Given by the Purchaser**

**14.1** Orders for supply of zinc wire meeting the requirements of this standard shall contain the following information:

- a) Diameter of wire,
- b) Type of finish, and
- c) Mass and diameter of coils/spools.

## **A P P E N D I X A**

*( Clauses 9.1 and 9.2 )*

### **METHOD OF TENSILE TEST FOR ZINC WIRE**

**A-0.** This test consists in subjecting a length of zinc wire to tensile stress, generally to fracture, with a view to determine one or more of the mechanical properties defined below.

#### **A-1. Terminology**

**A-1.1 Tensile Strength** — Maximum load reached in a tensile test divided by the original cross-sectional area of the test specimen, that is, the stress corresponding to the maximum load.

**A-1.2 Permanent Elongation** — The permanent variation of the gauge length of a test specimen after removal of the prescribed stress expressed as a percentage of the original gauge length.

**A-1.3 Percentage Breaking Elongation** — The permanent variation in the gauge length of a test specimen after breaking expressed as a percentage of the original gauge length.

#### **A-2. Test Specimen**

**A-2.1** The test specimen shall consist of a piece of wire of such a length that the distance between the grips of the tensile testing machine is not less than 150 mm with a gauge length of 100 mm.

#### **A-3. Test Requirement**

**A-3.1** Unless otherwise agreed to between the manufacturer and the purchaser, the cross-sectional area of the test specimen shall be measured to an accuracy of  $\pm 1$  percent. Tests for determination of tensile strength and elongation shall be carried out on five test specimens and the average of five readings arrived at for interpretation of the results.

#### **A-4. Determination of Tensile Strength**

**A-4.1** For determining the tensile strength, the test specimen shall be loaded by choosing an appropriate load range and the rate of loading shall be 0.5 to 1.0 kg/mm<sup>2</sup> per second. Increasing loads are successively applied to the test specimen and maintained in case for about 10 seconds. When fracture occurs, maximum load is recorded and the tensile strength is calculated in accordance with definition given in A-1.1.

#### A-5. Determination of Elongation

**A-5.1** When the elongation after fracture is to be determined, two or more over-lapping gauge lengths shall be marked on the straightened test piece with suitable accuracy. In practice this will be accomplished by marking a consecutive series of half gauge lengths with suitable accuracy.

The test piece shall be straight before it is marked. The marking is performed in such a manner that it does not cause fracture at the gauge marks.

The test specimen shall be gripped in such a manner that the distance between the ends of the grips and the adjacent gauge marks are equal.

The fractured parts of the test specimen are carefully fitted together so that they lie in a straight line. The increase in gauge length after the test is measured to the nearest 0.5 mm between the two marks on either side of the marks nearest to the fracture.

The measurement is valid in any case if the elongation reaches the specified value, whatever may be the position of the fracture.

#### EXPLANATORY NOTE

Zinc wire is primarily used for metal spraying on iron and steel parts for protection against atmospheric and galvanic corrosion. Metal spraying is also employed for building-up worn metal surface and recommended where hot dip galvanising is not physically and economically feasible.